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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/600,571	06/23/2003	Masao Hori	HARA-072-046	9645

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EXAMINER	
NGUYEN, TU MINH	
ART UNIT	PAPER NUMBER
3748	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/29/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/600,571	HORI ET AL.	
	Examiner	Art Unit	
	Tu M. Nguyen	3748	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 January 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,7,8 and 11-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,7,8 and 11-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 June 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☒ Certified copies of the priority documents have been received in Application No. 08/875,577.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. An Applicant's Request for Continued Examination (RCE) and an Applicant's Amendment filed on January 12, 2007 have been entered. Claims 5-6 have been canceled; and claim 1 has been amended. Overall, claims 1-4, 7, 8, and 11-16 are pending in this application.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-4, 7, 8, and 11-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Katoh et al. (U.S. Patent 5,402,641) in view Leyer et al. (U.S. Patent 5,643,542).

Re claims 1 and 11, as illustrated in Figures 1 and 5, Katoh et al. disclose a process for purifying exhaust gas from lean burning internal combustion engines, comprising the steps of:

- preparing an exhaust gas purifying-use catalyst (6) for purifying first exhaust gas produced under a driving condition at which an air-fuel ratio is stoichiometric (see lines 3-8 of the Abstract), the exhaust gas purifying-use catalyst consisting essentially of a noble metal, said catalyst including platinum (see line 65 of column 3) and a fire-resistant inorganic oxide (active

alumina, line 62 of column 3) carrying the noble metal, the fire-resistant inorganic oxide being active alumina; and

- purifying exhaust gas from a lean burning engine by contacting the exhaust gas with the single exhaust-gas purifying-use catalyst (6); and

wherein the exhaust gas varies between the first exhaust gas (stoichiometric or rich air-fuel ratios) having an exhaust-gas temperature in a range of 350 to 800°C at an inlet of the catalyst (step 106 with YES answer and step 108), and a second exhaust (lean air-fuel ratios) that forms a more oxidizing, low-temperature atmosphere as compared with the first exhaust gas, depending on changes in air-fuel ratio, and

wherein the second exhaust gas is controlled so as to have an exhaust-gas temperature which is lower than the first exhaust gas, and which is in a range of 200 to 350°C at the inlet of the catalyst (step 106 with NO answer and step 110).

Katoh et al., however, fail to disclose that their engine is a gasoline fuel-direct-injection type engine which allows fuel to be directly injected inside a cylinder of the engine; and that an amount of the noble metal being in a range of 0.01 to 50 g/liter with respect to the catalyst volume, an amount of the fire-resistant inorganic oxide being about 50 to 300 g/liter with respect to the catalyst volume, and a water-soluble compound being used as a source of the noble metal.

Katoh et al. disclose the claimed invention except for applying the invention to a gasoline fuel-direct-injection type engine. It would have been obvious to one having ordinary skill in the art at the time the invention was made to apply the invention of Katoh et al. to a gasoline fuel-direct-injection type engine, since the recitation of such amounts to an intended use statement. Note that a gasoline fuel-direct-injection engine also generates exhaust gases containing harmful

emissions of HC, NOx, soot, CO, and SOx, that require purification before the gases can be released to the atmosphere; and the mere selection of the purification process of Katoh et al. for use in a gasoline fuel-direct-injection engine would be well within the level of ordinary skill in the art.

As indicated in the Abstract and in the claims, Leyrer et al. teach a NOx conversion catalyst adapted to purify hydrocarbons, carbon monoxide, and NOx in the exhaust gas of an internal combustion engine. The NOx conversion catalyst comprises a catalytically active coating having a platinum metal group and a high surface area support material (claim 1). The platinum metal group is in a range of 0.01 to 5 g/liter of the catalyst volume (claim 9) and is obtained from a water-soluble compound (lines 38-49 of column 5, line 6 of column 7). The high surface area support material is a fire-resistant inorganic oxide (aluminum oxide/silicon oxide) in a range of about 200 g/liter with respect to the catalyst volume (lines 1-3 of column 7). It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the amounts of platinum and inorganic oxide taught by Leyrer et al. in the catalyst of Katoh et al., since the use thereof would have provided a catalyst having high efficiencies in removing HC, CO, and NOx in the exhaust gas.

Re claim 2, in the modified process of Katoh et al., the exhaust gas is purified by removing hydrocarbon, carbon monoxide, and nitrogen oxides from the exhaust gas by the use of the catalyst (6).

Re claims 3-4, in the modified process of Katoh et al., the first exhaust gas state appears when the air-fuel ratio is in the range of 13 to 15 (stoichiometric or rich air-fuel ratios), and the second exhaust gas state (lean air-fuel ratios) appears when the air-fuel ratio exceeds the above-

mentioned air-fuel ratio, wherein the second exhaust gas state appears when the air-fuel ratio ranges from more than 15 up to 50.

Re claim 7, in the modified process of Katoh et al., the catalyst (6) further comprises a transition metal (vanadium) (see claim 5 of Leyrer et al.), an amount of the transition metal being in a range of 0.01 to 50 g/liter with respect to the catalyst volume (see claim 9 of Leyrer et al.), and a water-soluble compound being used as a source of the transition metal contained in the catalyst (lines 50-55 of column 5 in Leyrer et al.).

Re claim 8, in the modified process of Katoh et al.,

- the gasoline engine includes obviously a cylinder that serves as a combustion chamber for gasoline as a fuel; an ignition plug (not shown but obviously must have); an injector (not shown but obviously must have) that is used for injecting the fuel; a control section (8) for controlling an ignition timing of the ignition plug and an amount of fuel injection of the injector, and

- the control section (8) controls an air-fuel ratio depending on the injector so as to cause the gasoline engine to be in the second exhaust gas state.

Re claim 12, in the modified process of Katoh et al., the catalyst further contains, as a co-catalyst, a rare-earth metal (line 67 of column 3).

Re claims 13-14, in the modified process of Katoh et al., the single exhaust-gas purifying-use catalyst that consists essentially of a noble metal (platinum) is obtained by impregnating a noble metal in the fire-resistant inorganic oxide.

Re claim 15, in the modified process of Katoh et al., the second exhaust gas (lean air-fuel ratios) is controlled so as to have an exhaust-gas temperature in a range of 200 to 300°C at the inlet of the catalyst (step 106 with NO answer).

4. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Katoh et al. in view Leyer et al. as applied to claim 1 above, and further in view of legal precedent.

The modified process of Katoh et al. discloses the invention as cited above, however, fails to disclose that the second exhaust gas is controlled so that an exhaust-gas temperature of the second exhaust gas is at least 200°C lower than an exhaust-gas temperature the first exhaust gas, at the inlet of the catalyst.

Katoh et al. disclose the claimed invention except for specifying that the second exhaust gas is controlled so that an exhaust-gas temperature of the second exhaust gas is at least 200°C lower than that for the first exhaust gas. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a specific optimum value of the second exhaust gas temperature, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Response to Arguments

5. Applicant's arguments with respect to the reference applied in the previous Office Action have been fully considered but they are not persuasive.

In response to applicant's argument that Katoh et al. utilize a three-way catalyst and therefore, fail to disclose or even suggest the use of a first gas and a second gas (pages 8-9 of Applicant's Amendment), the examiner respectfully disagrees.

The exhaust gas purifying-use catalyst (6) in Katoh et al. is an NOx absorbent that absorbs NOx in an exhaust gas stream under a lean air-fuel ratio condition and desorbs and reduces the NOx under a rich or stoichiometric air-fuel ratio condition (see Figures 3 and line 61 of column 3 to line 28 of column 4). Thus, in Katoh et al., the second gas is an exhaust gas stream from an internal combustion engine (2) that is operated with a normal lean air-fuel ratio mixture; and the first gas is the exhaust gas stream when the engine is operated with a rich or stoichiometric air-fuel ratio mixture to regenerate the catalyst.

In response to applicant's argument that the combination of Leyer et al. with Katoh et al. is improper because neither reference describes a direct fuel-injection gasoline engine (pages 10-11 of Applicant's Amendment), the examiner again respectfully disagrees.

The claim in the pending application that the pending invention is directed to a direct fuel-injection gasoline engine has been determined as an "intended use statement". The examiner has noted that most internal combustion engines (which includes the engine in the pending application and lean burning engine in Katoh et al.) that utilize a hydrocarbon source as a fuel generate exhaust gases containing harmful emissions of HC, NOx, soot, CO, and SOx, that require purification before the gases can be released to the atmosphere; and the mere selection of the purification process of Katoh et al. for use in a direct fuel-injection gasoline engine would be well within the level of ordinary skill in the art.

Communication

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Tu Nguyen whose telephone number is (571) 272-4862.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Thomas E. Denion, can be reached on (571) 272-4859. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tu M. Nguyen

TMN

January 22, 2007

Tu M. Nguyen
Primary Examiner
Art Unit 3748